WHAT IS CLAIMED IS:

1. An electrical current conducting element comprising:

at least a first oxidizing layer;

said first oxidizing layer being significantly oxidized in a laterally oriented first region, said first region exhibiting high electrical resistance;

said first oxidizing layer being modified within a laterally oriented second region forming a lateral oxidation barrier, said lateral oxidation barrier defining said second region which is not significantly oxidized and having electrical resistance significantly lower than said first region.

2. The conducting element recited in claim 1, further comprising a least one nonoxidizing layer adjacent to said oxidizing layer, and in which said modification of said first oxidizing layer comprises interdiffusion of said first oxidizing layer with said at least one nonoxidizing layer.

3. The conducting element recited in claim 1 wherein said second region is surrounded by said first region, forming an aperture.

4. The conducting element recited in claim 1 wherein said at least one oxidizing layer comprises a single oxidizing layer.

5. The conducting element recited in claim 1 wherein said at least one oxidizing layer comprises a plurality of oxidizing layers.

6. The conducting element recited in claim 2 wherein said at least one oxidizing layer is less than 500 angstroms thick.

7. The conducting element recited in claim 2 wherein said at least one oxidizing layer and said at least one nonoxidizing layer, both in said first region, have an average impurity concentration of less than $10^{17}/cm^{-3}$.

8. The conducting element recited in claim 2 wherein said interdiffusion has been enhanced by an ionic species.

9. The conducting element recited in claim 8 wherein said conducting element is further characterized being a first conductive type and wherein said ionic species is a dopant of said first conductive type.

10. The conducting element recited in claim 9 wherein said conducting element is p-type conductive and wherein said ionic species comprises an ionic species from the group including: carbon, zinc, beryllium, nitrogen or magnesium.

11. The conducting element recited in claim 9 wherein said conducting element is n-type conductive and wherein said ionic species comprises an ionic species from the group including: silicon or tellurium.

12. The conducting element recited in claim 2 wherein said at least one oxidizing layer is further characterized by tensile strain provided by a non-lattice-matching material having a concentration of at least 1 percent.

13. The conducting element recited in claim 2 wherein said at least one nonoxidizing layer is further characterized by compressive strain provided by a non-lattice-matching material having a concentration of at least 1 percent.

14. The conducting element recited in claim 2 wherein said interdiffusion is less than 100%.

15. The conducting element recited in claim 2 wherein said interdiffusion is less than 50%.

16. The conducting element recited in claim 2 wherein said interdiffusion is provided by ion enhanced interdiffusion.

17. The conducting element recited in claim 2 wherein said interdiffusion is provided by impurity induced layer disordering.

18. The conducting element recited in claim 2 wherein said interdiffusion is provided by optically induced local heating.

19. The conducting element recited in claim 2 in which at least one of said nonoxidizing layers resides above said first oxidizing layer and which further comprises at least one etched sidewall extending through said at least one of said nonoxidizing layers and into said first oxidizing layer;

said sidewall surrounding said lateral oxidation barrier.

20. The conducting element recited in claim 2 in which at least one of said nonoxidizing layers resides above said first oxidizing layer and which further comprises at least one etched sidewall extending through said at least one of said nonoxidizing layers and into said first oxidizing layer;

said sidewall not surrounding said lateral oxidation barrier.

21. The conducting element recited in claim 1 which comprises a plurality of said conducting elements.

22. The conducting element recited in claim 21 further comprising isolation means for providing electrical isolation between at least two elements of said plurality of conducting elements.

23. The conducting element recited in claim 22 wherein said isolation means comprises an ion implantation.

24. The conducting element recited in claim 1 wherein said conducting element is further characterized being a first conductive type;

said conducting element further comprising material of a second conductive type residing above or below said conducting element;

said conducting element and said material of a second conductive type forming an electrical junction.

25. The conducting element recited in claim 24 further comprising a light emitting material situated between said conducting element and said material of a second conductive type, forming a light emitting element.

26. The light emitting element recited in claim 25 wherein said light emitting element comprises a light emitting diode.

27. The light emitting element recited in claim 25 wherein said light emitting element comprises an edge-emitting laser diode.

28. The light emitting element recited in claim 25 wherein said light emitting element further comprises:

a substrate;

a first mirror situated above said substrate;

a first conductive spacer situated above said first mirror and below said light emitting material;

a second conductive spacer situated above said light emitting material;

a second mirror situated above said second conductive spacer;

a first contact for electrically contacting to said conducting element, and;

a second contact for electrically contacting to said material of a second conductive type;

said first and second mirrors and all material between forming an optical cavity having a cavity resonance at a nominal wavelength;

means for injecting electrical current through said conducting element and into said light emitting material, thereby causing said light emitting device to emit a beam of light at or near said nominal wavelength.

29. The light emitting element recited in claim 28 wherein said conductive element resides above said light emitting material.

30. The light emitting element recited in claim 28 wherein said first mirror comprises semiconductor layers.

31. The light emitting element recited in claim 28 wherein said first mirror comprises alternating layers of semiconductor and oxidized layers.

32. The light emitting element recited in claim 28 wherein said second mirror comprises semiconductor layers.

33. The light emitting element recited in claim 28 wherein said second mirror comprises alternating layers of semiconductor and oxidized layers.

34. The light emitting element recited in claim 28 wherein said second mirror comprises dielectric layers.

35. The light emitting element recited in claim 28 wherein said second region is surrounded by said first region, thereby forming an aperture.

36. The light emitting element recited in claim 35 wherein said light emitting element comprises a plurality of light emitting devices, at least two of said apertures on at least two of said light emitting devices having different sizes.

37. The light emitting element recited in claim 36 in which said plurality of light emitting devices are fabricated on a wafer, and in which said different sized apertures are predetermined to decrease the variation in said nominal wavelengths across said wafer.

38. The light emitting element recited in claim 36 in which said plurality of light emitting devices comprise at least first and second light emitting devices which are fabricated on similar locations on at least first and second wafers, said similar locations on said wafers having different thicknesses of said optical cavities;

in which said different aperture sizes are predetermined to decrease the difference between said nominal wavelengths of said first and second light emitting devices.

39. The light emitting element recited in claim 36 in which said plurality of light emitting devices are fabricated on a chip, and in which said different aperture sizes are predetermined to increase the variation in said nominal wavelengths across said chip.

40. An electrical current conducting element comprising:

at least a first oxidizing layer directly adjacent to and above or below at least one nonoxidizing layer;

said first oxidizing layer being significantly oxidized in a first region, said first region exhibiting high electrical resistance;

said first oxidizing layer and said at least one nonoxidizing layer being at least partially interdiffused within a second region forming a composite layer, said composite layer being not significantly oxidized, said second region having electrical resistance significantly lower than said first region.

41. The conducting element recited in claim 40 in which said oxidizing layer comprises oxidized portions and interdiffused portions of an initial material, in which the aluminum content of said initial material is greater than that of said nonoxidizing layer, and in which said nonoxidizing layer and said initial material respectively comprising material pairs selected from the group consisting essentially of: GaAs/AlAs, AlGaAs/AlGaAs, InAlGaAs/AlGaAs, InAlGaAs/AlGaAsP, InAlGaP/AlGaAs, InAlGaP/AlGaAsP, GaAsSb/AlAsSb,

AlGaAsSb/AlGaAsSb, GaPSb/AlPSb, AlGaPSb/AlGaPSb, InGaAs/AlGaAsSb, and InGaAsP/AlGaAsSb.

42. A vertical cavity surface emitting laser comprising:

a substrate;

a first mirror situated above said substrate;

a first conductive spacer situated above said first mirror;

a light emitting material;

a second conductive spacer situated above said light emitting material;

a second mirror situated above said second conductive spacer;

at least a first oxidizing layer, said first oxidizing layer being significantly oxidized in a laterally oriented first region, said first region exhibiting high electrical resistance, said first oxidizing layer being modified within a laterally oriented second region forming a lateral oxidation barrier, said lateral oxidation barrier defining said second region which is not significantly oxidized and having electrical resistance significantly lower than said first region;

a first contact for electrically contacting to said conducting element;

a second contact for electrically contacting to said material of a second conductive type;

said first and second mirrors and all material between forming an optical cavity having a cavity resonance at a nominal wavelength; and

means for injecting electrical current through said conducting element and into said light emitting material, thereby causing said light emitting device to emit a beam of light at or near said nominal wavelength.

43. The laser recited in claim 42 in which said nominal wavelength is greater than 1.2 μm.

44. A light emitter comprising:

a first mirror;

a light emitting material;

a second mirror;

at least a first oxidizing layer, said first oxidizing layer being significantly oxidized in a laterally oriented first region, said first region exhibiting high electrical resistance, said first oxidizing layer being modified within a laterally oriented second region forming a lateral oxidation barrier, said lateral oxidation barrier defining said second region which is not significantly oxidized and having electrical resistance significantly lower than said first region.

45. The light emitter recited in claim 44 further comprising an InP substrate.

46. The light emitter recited in claim 44 in which said light emitter is a vertical cavity surface emitting laser.

47. The light emitter recited in claim 44 in which said light emitting material comprises InGaAs.

48. The light emitter recited in claim 44 further comprising a nonoxidizing layer, said oxidizing layer and said nonoxidizing layer being interdiffused in said second region, in which said oxidizing layer comprises oxidized portions and interdiffused portions of an initial material, said nonoxidizing layer and said initial material respectively comprising material pairs selected from the group consisting essentially of: GaAsSb/AlAsSb, AlGaAsSb/AlGaAsSb, InGaAs/AlGaAsSb, and InGaAsP/AlGaAsSb.

49. A vertical cavity surface emitting laser comprising:

a substrate;

a first mirror situated above said substrate;

a first conductive spacer situated above said first mirror;

a light emitting material;

a second conductive spacer situated above said light emitting material;

a second mirror situated above said second conductive spacer;

means for electrically contacting to said first conductive spacer; and

means for electrically contacting to said second conductive spacer;

said substrate comprising a material selected from the group consisting essentially of: GaP, InP, InAs, GaSb, and InSb; and

said first mirror comprising high index layers and low index layers, at least one of said low index layers comprising an oxidized material.

50. The laser recited in claim 49 in which said oxidized material comprises an oxidized material originally selected from the group consisting essentially of: AlP, AlGaP, AlAsSb, AlGaAsSb, AlSb, AlPSb, AlGaPSb and InAlGaAsSb.

51. A method for producing an electrical conducting element comprising the steps of:

epitaxially growing at least a first oxidizing layer;

forming protection means in at least a first laterally oriented first region of said oxidizing layer, said protection means being to protect said oxidizing layer from modification;

modifying said oxidizing layer in at least a first laterally oriented second region not protected by said protection means, such modification inhibiting oxidation processes; and

oxidizing said oxidation layer in said first region, said modification inhibiting the oxidizing process in said second region.

52. The method recited in claim 51 further comprising the step of epitaxially growing at least a first nonoxidizing layer wherein said modifying said oxidizing layer comprises interdiffusion of said oxidizing layer with said nonoxidizing layer.

53. The method recited in claim 52 wherein said modifying said oxidizing layer further comprises an annealing process.

54. The method recited in claim 51 further comprising the step of epitaxial regrowth.

55. The method recited in claim 53 further comprising the step of epitaxial regrowth and wherein said modifying said oxidizing layer further comprises annealing in which said annealing step is at least partly provided during said epitaxial regrowth.

56. The light emitting element recited in claim 28, further comprising standing waves inside said cavity, wherein said oxidation barrier is located near a node of said standing waves.

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